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Personality and Attitude Differences Associated With the Elective Substitution of ROTC for the Physical Education Requirement in High School.[1]

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(Submitted for publication, September, 1947)

INTRODUCTION

PROPONENTS of military training in the schools have made wide claims that such training builds character, qualities of leadership, obedience, good citizenship, and physical fitness (10, 12, 16). Opponents of this program have expressed grave doubt that these aims are accomplished and suspect that other traits detrimental to society are being encouraged (2, 3, 6, 9, 17). Several authors have realized and pointed out the lack of research in this field (4, 5).

Rogers (13) used a questionnaire to determine certain attitudes held by college Reserve Officers Training Corps students. He compared the ROTC students (both elective and compulsory) with those not enrolled in military training. The results showed significant differences in the desire to wear a uniform. It was also found that the more training the student had the more likely he was to think that personality development resulted from taking ROTC. This led Rogers to wonder if a feeling of inferiority or a feeling of insecurity led to election of ROTC.

Forlano and Watson (7) compared those who elected Military Science in college with those who did not, with respect to the Feradcom Test (inferiority), Inex Test (extroversion), Army Alpha Test (intelligence). Both groups were found to be equal in intelligence, extroversion, and feelings of inferiority. When rank was taken as a criterion of success in the group that took Military Science, the cadet sergeants showed significantly greater extroversion and intelligence and slightly less inferiority than the cadet privates.

Scates and Spencer (14) studied boys of a secondary school graduating class who elected to take two years of military training

[1]From the Research Laboratories of the Department of Physical Education, University of California, Berkeley. The writer is indebted to Dr. Franklin M. Henry for advice and criticism during the course of this investigation.

during their junior and senior years. The program was introduced into the school in their junior year and did not serve to replace any subject requirement for graduation. They found that this military training program attracted a superior group as measured by intelligence, scholarship, and athletic and club participation. The authors suggested the general hypothesis that "drill in specific compliance with formulated requirements, in certain restricted areas of life, and for a limited portion of time in any day or week, may be a wholesome element in a person's development and possibly in his mature life." Scates and Spencer believed the study supported the view of military leaders that a certain amount of military discipline is good for youths, and that it does not destroy initiative nor warp personality development.

Certain other authors, mainly physical educators, have been more specific and have questioned the practice found in some high schools of allowing military training in the form of the Junior Reserve Officer Training Corps to be used as a substitute for physical education. These critics claim the high school military program is too restricted, boring, ineffectual, and is worse than worthless as physical education (1, 11, 15). Despite the serious concern in these circles over this allowed substitution, the protests and arguments stem from opinion and philosophical grounds. The present writer has found no studies which have attempted to discover how high school boys electing ROTC in preference to physical education might differ from the majority who accept the normal physical education program.

The above studies provide some basis for the belief that, as a group, the military training students may be expected to differ from the rest of the male students in certain respects. In addition, a survey of this particular situation in which military training is allowed to replace the physical education requirement would seem to point to a selective factor. In most California high schools the boys who choose ROTC rather than physical education consist of but a small percentage of the male students. The wearing of a uniform, congregating at the armory, and belonging to an organization that consists of but a small minority of the men students at the school, are all factors in making the ROTC enrollees a distinguishable group. Election to membership in a distinct and minority group would indicate the military students' realization and acceptance of differentiation from the majority of students. Such election might or might not be conditioned by an active dislike of the alternative, namely, participation in physical education classes.

Another consideration supporting the belief comes from this writer's personal observation. While a student at a high school where

this practice existed, it appeared that individuals taking ROTC spent most of their extracurricular time with their own military group and did not, on the whole, share the interests and amusements of the large majority of the student body.

It would be valuable to discover if those who avoid physical education in order to take ROTC are distinguishable in attitude or personality dispositions from the rest of the high school boys. The results of such a study would serve to indicate whether or not the ones who elect military training form an atypical group compared with the normal high school population and whether the elements of either activity play a part in the election. Such a study would not necessarily throw any light on the value of military training or physical education *per se* but would give some factual basis upon which one could more accurately analyze the controversial issue of the substitution of ROTC for the high school physical education requirement.

METHOD

In order to uncover some of the personality and attitude differences which may exist between the ROTC students and the rest of the male students, it seemed desirable to use an approach which (1) was adapted to the subjects and situation being studied, (2) allowed many suspected areas of personality and attitude to be explored, (3) could be standardized so the results could be handled quantitatively, (4) would not take an excess amount of the students' time, and (5) would not demand a highly trained and experienced investigator. The questionnaire technique best met these essential requirements and was thus selected as the method to use in examining this problem.

In preference to using a personality questionnaire already constructed and standardized, an eclectic approach was suggested by several clinical psychologists present at a seminar where the problem was discussed. It was reasoned that this method would allow the concentration and inclusion of all areas in which differences might be expected on the basis of the results of previous studies, observation, and theoretical reasoning.

Different lines of argument served as the basis for the inclusion of various areas of personality and attitude. First, it was hypothesized by the present writer that students would choose ROTC either because military training was more attractive or because physical education was distasteful. Thus questions were formulated which attempted to measure the relative attractiveness of ROTC and physical education to the two groups. For example, "In grade schools, nature study and hikes should take the place of playing organized

games" seemed a reasonable item. Items 14, 19, 31, 40, 45, 48, 50, 54, 64, 67, 70, 77, 88, 89, 100, 101, and 105[2] bear on the question of relative attractiveness of the two activities.

Items were also phrased with the intent to discover various elements (such as regimentation and competition) of both ROTC and physical education which might be the cause of a person's liking or disliking the two activities. "There would be less class prejudice if every student had to wear the same uniform or dress at school" and "A person should prefer to win rather than lose in a game" are examples of this line of inquiry. The items in this area are 6, 22, 25, 28, 35, 43, 45, 48, 50, 55, 56, 57, 59, 66, 67, 71, 72, 73, 77, 88, 89, 101, and 105.

Henry had used a questionnaire composed of items based on a factor analysis of the Thurstone and Bernruerter questionnaires plus 14 of the Allport ascendance-submission items to study differences between persons with high and low athletic ability (8) and also to study students taking and not taking physical education in a non-compulsory physical education program.[3] The two studies revealed responses which differentiated between the compared groups. It was felt that since these groups differed in their objective choice or avoidance of physical education and in some of the presumable outcomes of physical education, some insight into the basis of possible differentiation in the present problem might be gained by including these items. Henry's differentiating items included in the questionnaire used in this study are numbers 14, 16, 17, 18, 20, 21, 27, 28, 29, 33, 34, 37, 45, 61, 62, 65, 74, 83, 87, 90, 92, 98, 103, 104, and 106.

It was also considered possible that students who would elect ROTC might be quite concerned over their "manhood" and thus would not wish to compete in athletics (at a possible loss) with other students. To compete at a loss would in effect impugn their manliness so physical education would not be elected. Questions which might be termed "psuedo-toughness" items were included to explore this aspect of personality. "An insult to our honor should always be punished" and "People can be divided into two classes: the weak and the strong" are examples. The items in this group are 2, 24, 44, 49, 58, 69, 76, 82, and 85.

From personal observation and the results of the studies mentioned previously, the sociability, extroversion-introversion, and as-

[2]These numbers refer to items of the questionnaire. Differentiating items are given in the tables. Anyone interested in the other items may obtain a copy of the complete questionnaire from the writer.

[3]F. M. Henry. Personal communication. For a brief discussion of his use of this questionnaire with other differentiated groups, see *Psychol. Bull.* 1941, 88: 745.

cendant-submission types of items seemed to offer promising areas for investigation. By surveying standardized tests already in existence, items which appeared promising to the present writer were converted into the literary form of the experimental questionnaire. The Minnesota Personality Scale, the Minnesota Multiphasic Personality Inventory, and the Washburne Social Adjustment Inventory were used as sources.

The completed collection of items aiming to measure expected personality and attitude differences between the two groups (arbitarily called the G.A.H. Opinion Questionnaire) consisted of 106 statements. The word "opinion" was used in order to eliminate any stigma that the term "personality" or "attitude" might imply to the examinees. The items were phrased in the form of statements to which the subject responded by his degree of agreement, disagreement, or indifference. Most of the items were in the form of a direct statement about the examinee, i.e., "I like to go to parties and other affairs where there is much loud fun," while a few were put in a projective form, i.e., "A person should stand up for what he thinks is right."

The examinee indicated his response to each statement by the following seven point scale:

7. I agree very much.
6. I agree pretty much.
5. I agree a little.
4. I am neutral.
3. I disagree a little.
2. I disagree pretty much.
1. I disagree very much.

This seven-point scale was used so that the student was not held to a categorical answer but could qualify his response. As the individual was allowed to express the strength of his reaction, the group variability of responses to an item could be gauged accurately. Thus differences between the two groups, though they might be in the same direction, could still be ascertained. An attempt was made to formulate the questionnaire and the scale in such a way that the function of the test was disguised to the student.

The student sample for this study was obtained from a large city high school in which 103 boys out of the total male population of 1,054 substituted ROTC for the physical education requirement for graduation. The G.A.H. Questionnaire was administered to an unselected group of 86 in an ROTC class and to 116 physical education boys selected to include the same grade and age percentages

as that obtained in the military training sample. This was done to eliminate any effect that age or grade may have had on the reactions. The non-ROTC group was taken from a regular physical education class so that the sample would contain the typical boys and not predominately the athletes. As only 10.2 percent of the male students elected ROTC, the physical education group (consisting of all males not medically excused or taking ROTC) was visualized as a control group.

As each individual response was registered in one of the seven categories of agreement-disagreement, it was possible to construct a frequency distribution for both groups on each item by tabulating the individual responses. To simplify the calculations, mean response to the separate items was computed by assigning zero to the neutral reaction (4 on the scale), +1, +2, +3, for the increasing degrees of agreement, and —1, —2, —3 for the increasing degrees of disagreement. The differences between the means of the two groups to each item was divided by the standard error of that difference to obtain the critical ratio. In addition, it was believed that the significance of the displacement of each group from neutrality would be valuable to know, so the difference between each group mean and neutrality was divided by the standard error of that difference.

DISCUSSION OF DATA

Only those items yielding differences which were statistically significant at the 5 percent probability level or above are considered in this discussion. Twenty-nine items revealed a critical ratio of 1.92 or above between the two groups. The next most discriminating item had a C.R. of only 1.65. Thus 28 percent of the 106 items were significant at the 5 percent level of confidence; 20 percent of the total items were significant at the 1 percent level.

Since considerable confusion might arise from attempting to discuss the 29 items individually, and in order to secure some degree of organization in the findings, the items were divided into five rational categories. While the categorizing was done on broad terms, the descriptive titles are, in the writer's opinion, reasonably consistent with item content either directly or projectively.

The accompanying tables present the differentiating items (arranged into the five rational categories of content) in terms of the critical ratio of differences between means, the mean response of both groups, and the critical ratio of the difference of each mean from neutrality. The item is stated according to the response of the control group (the 89 percent who did not take ROTC). The ROTC group's relative agreement with the item as it is stated is indicated by the numerical value of its mean as compared with that of the

TABLE I

Statistical Summary of Differentiating Items in Category 1

(Attitudes toward physical activity and competition)

Item No.	C.R. of Diff.	Item	Control		R.O.T.C.	
			Mean	C.R. from Neutral	Mean	C.R. from Neutral
88	3.73	Do not believe nature study and hikes should replace playing organized games in grade schools.	1.17	6.85	.19	.99
77	3.65	Believe athletic games should be taught in elementary schools in a physical education class.	2.43	27.35	1.73	10.24
19	3.13	Do not believe a person who wins a gold football should be modest and not wear it to school to show off.	1.05	5.86	.12	.54
45	3.09	Do not prefer participation in competitive intellectual amusements to athletic games.	.47	2.28	— .41	2.07
6	2.90	Believe a person should prefer to win rather than to lose in a game.	2.36	23.43	1.69	8.40
14	2.77	Enjoy playing athletic games outside of school.	2.38	23.65	1.81	10.37
54	2.47	Make it a point to go to all of the school's important football games.	1.11	6.44	.42	1.89
100	2.20	Believe physical education helps a person use his leisure time to better advantage.	1.86	12.17	1.34	7.32
56	2.06	Believe it is very difficult for a person to keep his temper if he is trying hard to win a game.	.50	2.57	— .12	.50
73	1.98	Do not refuse to play certain games because they are not good at them.	1.17	6.34	.58	2.47

control's, while its disagreement with the stated item is shown by a minus sign.

Attitude Toward Physical Activity and Competition.—The items in this category (Table I) indicate the ROTC students' comparative dislike or projection of dislike for physical activity and competition, whether it is in the form of physical education or of afterschool recreational activities. As compared with the control group, the boys taking military training are closer to neutral in not believing nature study and hikes should take the place of playing organized games in grade schools, in believing athletic games should be taught in elementary schools in a physical education class, in not believing that a person who wins a gold football should be modest and not wear it to school, in believing a person should prefer to win rather than lose in a game, in enjoying the playing of athletic games outside of school, in making it a point to go to all of the school's important football games, in believing physical education helps a person to use his leisure time to better advantage, and in not refusing to play certain games because they cannot play them well. The military group prefers participation in competitive intellectual amusements to athletic games, and believes it is not very difficult for a person to keep his temper if he is trying hard to win a game. The responses to these last two questions are in the opposite direction from the control group.

The military students state that they prefer intellectual amusements while the majority of students prefer athletic games. It would be interesting to ascertain if the two groups do actually differ in their intellectual pursuits. The item "It is difficult for a person to keep his temper if he is trying hard to win a game" gave the military group an opportunity to condemn competition because of its emotion-disturbing effect, but these boys failed to agree with this statement. Their response to this item may reflect a lack of experience with the competitive situation. With high motivation, it certainly is difficult to control one's temper during highly competitive games. Physical educators recognize this and feel that such experiences are important in teaching a person to control his temper.

The ROTC group's relative avoidance of athletics and competition could be due to low athletic ability although the members state that they are not slow learners physically in answer to the item "I am a slow learner physically." In fact, they disagree with this statement more than the control group, but the difference is not statistically significant (C.R. = 1.48).

Possibly their responses may indicate a desire to avoid competing individually against others in social situations, although they do prefer intellectual competition to physical competition.

TABLE II

Statistical Summary of Differentiating Items in Category 2

(Attitude toward organized uniformed groups)

Item No.	*C.R. of Diff.*	*Item*	*Control*		*R.O.T.C.*	
			Mean	*C.R. from Neutral*	*Mean*	*C.R. from Neutral*
31	13.09	Do not believe experience in ROTC gives a person confidence in other fields.	1.22	7.32	—1.92	16.89
50	8.10	Do not believe marching can be an enjoyable type of activity and should be made a part of the physical education period.	1.67	10.04	— .63	2.73
57	6.59	Believe every boy should have the experience of being in a Boy Scout troop and participating in its activities.	.16	1.20	1.57	9.15
59	3.87	Do not believe there would be less class prejudice if every student had to wear the same uniform or dress at school.	1.47	8.50	.35	1.51

Attitude Toward Organized Uniformed Groups.—The ROTC students are stronger in their belief that experience in ROTC gives a person confidence in other fields, that marching should be made part of the physical education period, and that every boy should belong to a Boy Scout troop and participate in its activities (Table II). They are closer to neutral (on the average) in not believing there would be less class prejudice if everyone wore the same uniform; 29.1 percent positively state they believe there would be less prejudice compared with 13.8 in the controls. To the items on "confidence" and "marching," the two groups answer in opposite directions, with the military students agreeing with both statements and the non-ROTC students disagreeing. The common element in this category would seem to be characterized by uniforms, marching, and distinct group membership. Boy Scouts do other things certainly, but these are not the things that are held in common with ROTC.

Although some activities are on an individual basis in these uniformed organizations, a person can be accepted by simply participating in the activities performed as a group. In physical activities, a person's acceptance by the group is primarily due to a willingness and capability to participate with individual responsibility, while in ROTC and in a Boy Scout troop the uniform in itself constitutes admission to and identification with the group. Membership in the uniformed group strengthens the individual, while in physical activities the group may give its strength to the individual but does not automatically give him strength in a psychological sense.

Sociability.—Items in this category (Table III) seem to measure a person's estimate of his interests, desire, and ability to get along socially. The average ROTC student keeps in the background at social affairs, does not attempt to meet the important person present at a tea or reception, is less inclined to go to parties and other affairs where there is much loud fun, indicates less preference for working with others, is less likely to enjoy dates with the opposite sex, is not as well liked by most of the people who know him, is more likely to feel lonesome even when he is with other people, and is more likely to feel he is a person very different from other people. In his claim that he "keeps in the background at social affairs" and does not "attempt to meet the important person present at a tea or reception," the average military student responds in the opposite direction from the average member of the control group.

Experts may claim some of these items measure ascendance-submission and others, that they measure introversion-extroversion, but it does not seem desirable here to draw fine lines of definition. At best, the psychological interpretation of such items is difficult,

TABLE III

Statistical Summary of Differentiating Items in Category 3

(Sociability)

Item No.	*C.R. of Diff.*	*Item*	*Control*		*R.O.T.C.*	
			Mean	*C.R. from Neutral*	*Mean*	*C.R. from Neutral*
12	4.62	Like to go to parties and other affairs where there is much loud fun.	1.62	11.05	.48	2.39
91	3.52	Do not keep in the background at social affairs.	.32	2.03	— .58	2.88
61	3.52	Usually prefer to work with others.	1.84	12.16	.95	4.75
18	2.90	Attempt to meet the important person present at a reception or tea.	.34	2.20	— .38	1.96
23	2.77	Enjoy dates with the opposite sex.	2.31	21.58	1.72	9.39
46	2.64	Are liked by most people who know them.	1.18	14.66	.72	4.17
95	2.29	Are not persons who are very different from other people.	.84	5.15	.21	.95
87	1.92	Are not lonesome when they are with other people.	1.39	7.59	.83	3.63

and psychologists do not always agree among themselves as to the true interpretation of inventory items. The common element in all the items of this category do, however, seem to be concerned with a person's disposition toward social situations.

Compared with the majority of students, the members of the military group claim shyness and social withdrawal. This finding is in logical agreement with the attitudes expressed in the first two categories, which indicated an avoidance of direct physical competition and a satisfaction in being a member of a uniformed group primarily engaged in uniform activities. There seems to be a relative and sometimes even an active aversion for individual participation in social situations.

Attitude Toward Authority and Position.—In their attitude toward authority and position (Table IV), the military training students believe that students elected to school offices are more popular than the rest of the students, are more likely to consider it an honor to be elected class president, are greater in their belief that obedience and respect for authority are the most important virtues one should learn, and have not tried to bluff their way past a guard or doorman.

This finding might be expected since an attitude of acceptance toward authority and position ought to be an essential quality of those desiring membership in organized groups that emphasize military discipline. It would seem reasonable to interpret this respect for authority and position as a means by which the students can subordinate their individuality to the higher authority and thus rationalize their lack of individual initiative.

Miscellaneous.—The boys taking military training are not as strong in their preference for the men over the women teachers, also, in not having a great many bad headaches and in usually feeling well and strong. The items in this miscellaneous category (Table V) do not appear logically to fall into any of the other divisions.

What is implied by the military group's lesser preference for men teachers over the women teachers is hard to say. This tendency, even though slight, may indicate incomplete weaning from childhood dependence on the mother (21.1 percent of ROTC students prefer women teachers as compared with 12.1 percent in the controls). Possibly, also, their male physical education teachers in junior high school demanded participation in athletic games and they now associate these demands with men teachers.

The last two items on "feeling well and strong" and having "many bad headaches" are taken by many investigators as an indication of hypochondria or anxiety over one's health. However, it

TABLE IV

Statistical Summary of Differentiating Items in Category 4

(Attitude toward authority and position)

Item No.	C.R. of Diff.	Item	Control Mean	Control Neutral C.R. from	R.O.T.C. Mean	R.O.T.C. Neutral C.R. from
34	3.73	Have tried to bluff their way past a guard or doorman.	.49	2.27	— .77	2.95
2	2.76	Believe obedience and respect for authority are the most important virtues children should learn.	1.95	14.57	2.42	22.63
32	2.19	Consider it an honor to be elected class president.	1.61	10.28	2.11	13.04
13	2.16	Do not believe students elected to school offices are more popular than the rest of the students.	.03	.14	— .63	2.62

TABLE V

Statistical Summary of Differentiating Items in Category 5

(Miscellaneous)

3	2.84	On the whole prefer the men over the women teachers.	1.23	7.69	.52	2.73
98	2.72	Usually feel well and strong.	2.10	19.17	1.49	7.53
74	2.55	Do not have a great many bad headaches.	2.03	13.22	1.37	6.58

would appear that the responses to these two items may be excuses which the ROTC students give to themselves to account for their aversion for physical activities, competition, and social intercourse.

General Discussion.—The stage of maturation may possibly account for the military students' relative avoidance of social competition. Although the attempt was made to neutralize the effect of maturity by selecting the same age and grade percentages in both samples, the ROTC boys may not have reached the same degree of development as the rest of the boys. This would put them at a physical disadvantage and tend to make them shy away from individual competition. Unfortunately, no data are available to check this point.

In the light of these findings, the evaluation of a program which allows for the substitution of ROTC for the physical education requirement must be a question of objectives. If, regardless of a person's attitudes and personality dispositions, it is felt that every high school boy should have the experience of competing individually in physical education (even to the point of forcing him to do so), the substitution should not be allowed. However, it appears that ROTC enables a boy, atypical in certain respects, to avoid something that is distasteful and frustrating to him but still enter an activity which is pleasant and self-satisfying. To be aware of his frustrations in a physical education class, and to enter an activity which serves a need, shows intelligent action on the part of the ROTC electors. From this point of view, ROTC is highly desirable for students who differ from the majority as it is psychologically good for them.

CONCLUSIONS

In their response to a questionnaire, those high school students who choose to take ROTC in substitution for the physical education requirement for graduation appear to form a group which differs in certain respects from the majority of male students at the school. A rational classification of the differentiating items indicates the military students have an attitude less in favor of physical activity and competition, a more favorable attitude toward membership in organized uniformed groups, authority and position, and a withdrawing disposition in social situations as contrasted with the majority of high school boys.

Strictly speaking, the only thing truly proved by this study is that the ROTC group differs from the control group in response to specific questionnaire items. However, the results do point to the possibility that ROTC appeals to a group which differentiates in attitudes, interests, and social adaptation from the rest of the boys

in the school; thus ROTC may serve as a means of securing vicarious success of a sort for the boy of a certain type. It appears that the military student's dislike for physical activity, competition, and social activities, the preference for organized uniformed groups, and the acceptance of position and authority, can be considered an issue of individuality. Competition at a loss in individual activities makes a weakness apparent, but by belonging to a uniformed organization the individualism is lost and the student can hide behind the strength of the group.

IMPLICATIONS

To properly evaluate these findings it is necessary to understand that if ROTC is elective (not required), and students who voluntarily elect this training are psychologically differentiated from the non-electors in the direction this study appears to indicate, it would seem that they would have much to gain by joining the ROTC group. If they tend to be frustrated in physical competition and do achieve satisfaction by being members of a uniformed group, the psychologically correct solution would recognize this fact.

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The Graduate Minor in Physical Education

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(Submitted for publication, October, 1947)

THE purposes of this study were (1) to determine present practices relative to minors taken by graduate majors in physical education, and (2) to determine present practices relative to minors in physical education taken by other graduate students. The report is limited to the master's degree.

Copies of a questionnaire were sent on April 21, 1947, to the 38 institutions listed by the U. S. Office of Education as offering graduate degrees in physical education[1]; to this list were added 26 others reported by Hewitt in 1942 in the *Research Quarterly*.[2] A list of these institutions is included at the end of the article. Returns were received from 59 institutions or 92 percent.

Fifty-two or 88 percent of the 59 institutions replying offer higher degrees with a major in physical education. In Table I is shown the kinds of degrees and number of institutions offering them.

TABLE I

Degree	*Number of Institutions Offering*	*Percent*
Master of Arts	25	48
Master of Science	25	48
Master of Education	20	38
Master of Physical Education	3	5
Master of Science in Education	2	4
Master of Science in Phys. Educ.	2	4
Doctor of Education	16	31
Doctor of Philosophy	14	26

Among those institutions reporting a graduate major in physical education, the required number of graduate semester hours in the major for the master's degree ranges from 11 to 45 semester hours, with the mode at 30 hours. Twelve institutions reported a require-

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1Stella T. Sebern. *Institutions Giving Professional Training in Physical and Health Education*. Washington, D. C.: U. S. Office of Education, Federal Security Agency, 1940.

2Jack Hewitt. "The Graduate Major in Physical Education." *Research Quarterly*, 13: 1942, 252-256.

ment of 30 hours. The mean number of hours required in the major was 24. The number of weeks of residence required most frequently reported was 36, 16 institutions thus reporting. In a number of cases the required residence was reported in years, quarters, or semesters, 5 institutions reporting 1 year of residence, 5 reporting 3 quarters required, and 1 institution reporting 2 semesters required.

Of the 52 institutions offering a higher degree with a major in physical education, 21 or 40 percent require a graduate minor in another field, 15 or 28 percent have an optional minor, while 14 or 26 percent require no minor. Two reported that the major program in physical education is integrated in other courses of study.

Eighteen or 34 percent of the institutions reported that a qualifying examination is given to all physical education majors. One institution reported the requirement of a qualifying interview as a part of its admission requirements.

The number of semester hours required in the minor ranged from 4-18, the mean being 10. Four institutions require work in other fields, ranging from 6 to 16 semester hours.

The fields reported most generally chosen for a graduate minor are shown in Table II.

TABLE II

Subject	*Number of Institutions*	*Subject*	*Number of Institutions*
Education	20	Public Health	3
Psychology	13	Health Education	2
Sociology	13	Dance	2
School Administration	7	Science	1
Social Studies	7	Mathematics	1
History	7	Personnel Administration	1
Biology	7	Child Welfare	1
Physiology	6	Measurement	1
Recreation	5	Political Science	1
Secondary Education	4	Physical Therapy	1
Guidance	4	Journalism	1
Zoology	3	English Drama	1
Hygiene	3	Art	1

Thirty-three or 63 percent of the institutions offer a minor in physical education to students from other graduate departments. These institutions are listed at the end of the article. Requirements for this minor ranged from 4 to 27 semester hours, the mean being 10.5.

The major fields from which graduate students come to take a physical education minor are shown in Table III.

TABLE III

Subject	*Number of Institutions*	*Subject*	*Number of Institutions*
Education	24	Music	2
Sociology	9	Art	2
School Administration	6	Vocational Education	1
Secondary Education	3	Health	1
Guidance	3	Mathematics	1
Biology	3	Educational Philosophy	1
History	3	Commerce	1
Social Studies	2	Public Health	1
Sciences	2	Physiology	1
Recreation	2	Business	1
Psychology	2	Speech	1

Fifty-seven percent of the institutions reported that the course requirements for the physical education major were different from those of the minor. These differences were in a greater number of prerequisites required for the majors. These were generally in anatomy, zoology, physiology, and physical education courses.

Five institutions require a qualifying examination for all physical education minors. This was 15.6 percent of the schools reported having a minor. Six institutions or 18.8 percent require a written report similar to a thesis or project for all physical education minors.

Nine institutions reported having a double major. Five institutions reported that the double major is divided equally between physical education and education. Three institutions reported the double major in physical education and health education. One of these institutions reported that the courses were divided equally; one institution reported a division of 15 hours in physical education and 8 in health education, while another reported a division of 21-24 hours in physical education and 6-9 hours in health education. One institution reported a double major divided equally between physical education and other fields not specified.

The minors are determined in various ways as shown in Table IV. In most cases two or more categories were indicated.

TABLE IV

By Whom Chosen	*Number of Institutions*
Student	30
Department Chairman or Head	19
Advisory or Graduate Committee	10
Advisor or Major Professor	5

SUMMARY

From this report it is clear that the practices in administering the graduate minors for the masters' degrees in various institutions is not uniform. Only 60 percent of the institutions report a graduate minor being offered to majors in other fields and most of these students are from the department of education. For the physical education major student the practice of completing minors in other fields

varies also. Only four institutions require graduate students to complete a minor in another field. The most frequently selected fields are education, sociology, and biology. Nine institutions report offering a double major of physical education and education or physical education and health education.

INSTITUTIONS INCLUDED IN THE STUDY OFFERING A GRADUATE DEGREE IN PHYSICAL EDUCATION

Alabama: University of Alabama.*
California: Claremont College, College of the Pacific, Mills College,* Pomona College (revising its program),* Leland Stanford University,* University of California at Berkeley (For general secondary credential only),* University of California at Los Angeles,* University of Southern California*
Colorado: University of Colorado,* Colorado State College of Education.
Florida: University of Florida.*
Georgia: University of Georgia.
Idaho: University of Idaho.
Illinois: University of Illinois,* George Williams College, Northwestern University.
Indiana: Indiana University,* Purdue University.*
Iowa: State University of Iowa.*
Kansas: University of Kansas.
Kentucky: University of Kentucky.
Louisiana: Louisiana State University.*
Massachusetts: Smith College, Springfield College, Boston University, Wellesley College.
Michigan: Michigan State College,* University of Michigan, Wayne University.
Minnesota: University of Minnesota.*
Missouri: University of Missouri.*
Montana: State University of Montana.
Nebraska: University of Nebraska.*
New Mexico: University of New Mexico.
New York: New York University, Syracuse University, Teachers College of Columbia University.
North Carolina: University of North Carolina.*
Oklahoma: Oklahoma A. & M. College.*
Ohio: Kent State University,* Ohio State University, Ohio University,* University of Cincinnati,* Oberlin College.
Oregon: Oregon State College,* University of Oregon.
Pennsylvania: Temple University, Pennsylvania State College,* University of Pennsylvania, University of Pittsburgh.
Tennessee: University of Tennessee,* George Peabody College for Teachers.*
Texas: Baylor University,* University of Texas,* North Texas State Teachers College.
Utah: Brigham Young University,* University of Utah.*
Washington: College of Puget Sound, University of Washington,* State College of Washington.
West Virginia: West Virginia University.
Wisconsin: University of Wisconsin.
Wyoming: University of Wyoming.*

*These institutions also offer a minor in physical education.

Reaction Time of Male High School Students in 14-17 Year Age Groups

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(Submitted for publication, October, 1947)

INTRODUCTION

STUDIES involving voluntary or involuntary response of individuals to stimuli under varied conditions are numerous. Of particular interest in the field of voluntary reaction time is the relationship between chronological age and reaction time. It is known that in infancy an individual does not possess the ability to perform certain neuromuscular skills as well as he does at a later period. The question as to the age at which the maximum efficiency of response time is reached has apparently not been fully explored. This study was conducted in an attempt to determine whether a significant difference in simple reaction time exists between age groups of male high school students.

REVIEW OF THE LITERATURE

A study relative to the effects of fatigue upon reaction time of workers in industry was done by Ash (1) after which he concluded that " . . . the principle of fatigue is the loss of efficiency, a lessening of capacity to do work, or to sustain activity, together with a lowering of sensitivity so that a given stimulus calls forth a response of less magnitude and intensity after exertion, than before." Franz (8) found fatigue is evidenced by inaccuracies of movement as well as lengthening of the times of movement. In studying the effects of specific periods of strenuous physical activity on reaction time, Elbel (7) learned that in many instances there was an improvement in hand and body movement following periods of strenuous exercise. After working in the field of reaction time of athletes, Griffith (10) concluded that fatigue slows the reaction time of individuals.

Marsh (14) found that there was a difference in reaction time in the morning as compared to that in the afternoon. A study conducted by Elbel (6) in which the movement of the hand in response to stimulus was measured showed that there was a period in the morning and another in the afternoon in which response was best. The maximum speed was accomplished in the afternoon.

Westerland and Tuttle (17) in measuring the response time of athletes found that champions were superior in response when compared to other groups. Also, they learned that short-distance runners responded faster than long-distance runners. Using the patellar reflex, Lautenbach and Tuttle (13) learned that men who run shorter distances have shorter reflex time and vice versa. Nakamura (15) secured similar results on track athletes.

Pfitsch (16) used 100 athletes and 100 non-athletes and compared the movement of the hand and the movement of the body in response to auditory stimulus. The athlete was slightly superior in movement of the hand and significantly so in the movement of the body.

Beise and Peasley (2) studied the reaction time of men and women based upon the movement of hand and foot. A skilled group composed of 11 archers, 12 golfers, and 24 tennis players showed faster and more stable reaction time than an unskilled group.

Burpee and Stroll (4) found that men who participated in physical activity with marked success had consistently faster reaction times. Using athletes as subjects, Burley (3) employed both simple and complex visual stimuli. His results showed that all individuals reacted more slowly to the complex stimulus, and that there was a significant difference in speed and variability of reaction time among football linemen, football backs, basketball men, swimmers, high school letter winners, and non-letter winners. According to Keller (12) there is a positive relationship between moving the body quickly and success in athletic activities.

Brown (5) used the patellar tendon reflex to determine racial difference in response, and learned that whites were slower in response than negroes.

After measuring the neuromuscular response of sprinters, Hammel (11) concluded that the leg movement in sprinting does not approach the possible rate of contraction as limited by the neuromuscular mechanism. Leg rates attained in cycling are far greater than any possible rate in sprinting. The speed he feels is determined by the load.

In relationship to chronological age and reaction time, Goodenough (9) used 245 children ranging from 2½ to 11½ years of age and 56 college students. He retested 105 after an interval of 1 year and 58 after an interval of 2 years. Among his several conclusions he states: "The development of the reactive process during childhood is shown not merely by improved speed of reaction, but to an even more marked degree in the gaining of voluntary con-

trol over the motor act. The improvement in voluntary control is shown in the gradual reduction of useless accessory movements preceding and accompanying the act of pressing the reaction key and in fewer signs of bodily tension as age advances . . . The developmental changes with age in variability are much more marked than the improvement in average speed."

PROCEDURE

In this study 247 male high school students ranging in age from 14 to 17 years were used as subjects. They were divided into their respective age groups and tested individually by the same tester for speed of hand and body movement in response to a stimulus.

All subjects were tested under similar conditions during the school day at least one hour after meals. Strenuous physical activity was not allowed prior to the testing period. Uniform instructions were given all subjects prior to testing during which time each was informed that while he was expected to do his best, the results of his efforts would have no bearing upon his grades. In order to eliminate the possibility of competition between subjects, test results were not shown to the subjects.

The data for this study were compared with the results obtained by Pfitsch (16) who used the same apparatus in testing college students.

Hand Response.—The apparatus described by Elbel (6) was used for this study. The subject sat at a table containing the stimulus-response unit. He was instructed to place the hand of his choice outside the guide line 3½ inches from the edge of the hand switch. The subject was then informed that in order to respond in a correct manner it would be necessary to strike the hand switch with the palm of his hand as quickly as possible after the stimulus bell started ringing. He was also informed that striking the hand switch would stop the ringing of the bell and the timing unit. In the earlier investigation referred to above, this test showed a coefficient of reliability of 0.9637. This coefficient of reliability was accepted for this study.

Body Response.—The speed of body movement was measured as described by Elbel (7). Lines were placed on the floor at distances of three-inch intervals from 5 feet 3 inches from the wall switch to 6 feet 3 inches. The subject took a stance with one foot slightly behind the other and with the toe of the forward foot back of a line at a distance from the wall approximating his height. Knees were slightly bent and hands were placed on the knees. Upon hearing the sound of the bell the subject stepped forward with his rear foot,

extended his arms and struck the wall switch. Striking the wall switch stopped the ringing of the bell and the timing unit simultaneously. A coefficient of reliability of 0.9875 for this test determined in the study referred to above was accepted for this study.

An auditory stimulus caused by the ringing of a bell was used throughout this study.

Earlier studies (7) showed that when using this apparatus, 20 practice trials were necessary to insure full conditioning for the tests. This procedure was followed in this study. After having completed the conditioning trials, each subject was allowed seven trials for the hand response and body-movement test.

A Central Scientific Company Impulse Counter and Interval Timer was used as a timing device. Measurements were taken in units of 1/120 of a second and transposed to units of 1/100 of a second. A telegraph key hidden from view of the subject, when pressed by the operator, rang the bell and started the timer simultaneously.

RESULTS

The data are presented in terms of mean scores for age groups based upon seven trials for each subject for hand response and the same number for body response. The coefficients of correlation between hand and body response for each group were also calculated (Table I). The data from this study were compared with results obtained in a similar study done on university students in which the same apparatus was used (16).

Referring to Table I, it will be seen that for the hand response there is a more rapid mean response with each successive age group. Also, it should be noted that there is less variation in response with increase in age. The speed of body response shows a mean improvement with age with one exception. The slowest mean response was for the 15-year-old group. The greatest variation from the mean

TABLE I

MEANS, STANDARD DEVIATIONS, AND COEFFICIENTS OF CORRELATION FOR HAND AND BODY RESPONSE BY AGE GROUPS

Group	*No. Cases*	*Mean Hand*	*SD Hand*	*Mean Body*	*SD Body*	*r Body vs. Hand*
14 yr.	69	.2754	.0436	.8173	.0780	+.34
15 yr.	62	.2716	.0358	.8263	.0795	+.33
16 yr.	58	.2631	.0325	.7973	.0855	+.43
17 yr.	59	.2593	.0279	.7948	.0785	+.24
All Subjects	247	.2675	.0349	.7986	.0782	
University Students	200	.2469	.0212	.7824	.0829	

as indicated by the standard deviation is shown in the data for the 16-year-old group.

In comparing the data of this study with those collected by Pfitsch (16) it was found that the means for both hand and body response showed greater speed for the university group. While the university group showed less variation in hand response, this group was more variable in the body response.

In comparing the means for the high school groups in this study, it was found that there was no significant difference between the means for any of the groups in either the hand or body response. The means, obtained differences between means, and critical ratios are shown in Table II. It should be mentioned that there is a distinct tendency toward improvement in hand response with increased age. When comparing the means for high school groups for movement of the hand with the mean for university students it was found that there was a significant difference for all groups in favor of the university students. This is true also for the composite mean for all high school students when compared to the mean for university students. In the movement of the body the means for 14- and 15-year-old age groups differed significantly from those of the university group. There was no significant difference between the composite mean for high school students and the mean for university students, although there was a difference in favor of the university group.

Coefficients of correlation between hand and body response for each age group are shown in Table I. In each instance the coefficient is significant but low.

DISCUSSION

It has been found that there are a number of factors which might increase or decrease reaction time, among them fatigue, stimulants, period of testing, and the amount of exercise prior to testing. Attempts were made to control these factors in this study. Several studies indicate that the athlete responds more readily than the non-athlete. Whether the athletic competition contributes to the development of more rapid response to stimulus or whether the type of individual with better response is more apt to participate in sports has not been fully answered. While the subjects for this study were selected at random, it was found that a representative number of members of the various athletic squads was contained in each age group.

On the basis of these data and the data presented by Pfitsch (16), it would seem that the maximum efficiency in reaction time has not been reached fully at the high school level. There are also indications that the response time improves with increase in age, including the university level.

TABLE II

MEANS, OBTAINED DIFFERENCES BETWEEN GROUP MEANS AND CRITICAL RATIOS, FOR HAND AND BODY RESPONSE

HAND

Age Groups	*Mean*	*Obtained Difference*	*Standard Error*	*Critical Ratio*	*Chances in 100*	*S D*
14 yr.	.2754					.0436
14-15		.0038	.0063	0.60	73	
14-16		.0123	.0068	1.81	96	
14-17		.0161	.0064	2.52	99.4	
14-Univ.		.0285	.0055	*5.22	100	
15 yr.	.2716					.0358
15-16		.0085	.0062	1.36	91	
15-17		.0123	.0058	2.12	98	
15-Univ.		.0247	.0066	*3.75	100	
16 yr.	.2631					.0325
16-17		.0038	.0056	0.68	76	
16-Univ.		.0162	.0045	*3.64	100	
17 yr.	.2593					.0279
17-Univ.		.0124	.0039	*3.16	100	
University	.2469					.0212
H. S.-Univ.		.0206	.0026	*7.67	100	

BODY

Age Groups	*Mean*	*Obtained Difference*	*Standard Error*	*Critical Ratio*	*Chances in 100*	*S D*
14 yr.	.8173					.0780
14-15		.0090	.0137	—0.65	74	
14-16		.0200	.0147	1.36	91	
14-17		.0225	.0139	1.62	94	
14-Univ.		.0349	.0110	*3.17	100	
15-yr.	.8263					.0795
15-16		.0290	.0151	1.92	97	
15-17		.0315	.0143	2.20	98.6	
15-Univ.		.0439	.0116	*3.78	100	
16 yr.	.7973					.0855
16-17		.0025	.0151	0.17	76	
16-Univ.		.0149	.0125	1.19	86	
17 yr.	.7948					.0785
17-Univ.		.0124	.0117	1.06	85	
H. S.-Univ.		.0162	.0070	2.31	98.9	

*Significant.

Goodenough (9) found marked improvement in reaction-time with increase in age in his study with children. He noticed improved voluntary control and a gradual reduction of useless accessory movements with less variation in the older groups. This study shows similar results for the movement of the hand. There is a consistent improvement in response time from group to group, with the greatest mean speed found in the 17-year-old group. Pfitsch's mean for the university group is significantly better than the 17-year-old group of this study. Likewise, there is consistently less variation for the older age groups with university students less variable than the older

high school group. This study indicates that there is not the same degree of consistency in improvement in the movement of the body as in the movement of the hand.

SUMMARY AND CONCLUSIONS

Two hundred and forty-seven male high school students in 14-, 15-, 16- and 17-year age groups were used as subjects for measuring the hand and body response to an auditory stimulus. The mean scores for each group were compared with those for each of the other groups. The results of this study were then compared with the data gathered on a similar study in which university students were used as subjects. On the basis of the data it is concluded that:

1. A slight difference exists between hand response time for each high school group with the tendency for more rapid response with increase in age. The differences between age groups are not statistically significant (Table II).

2. A slight difference exists between the means for the body-response time for each high school age group. There is a tendency for reaction time to improve with increasing age, with the exception of the 15-year age group. The mean for this group is slightly slower than that of the 14-year age group. None of the mean differences is statistically different (Table II).

3. The mean for hand response time for each high school group differs significantly from the mean for the university group. In each instance the difference is in favor of the university group (Table II).

4. While the means for the body response for the 14- and 15-year-old high school groups differ significantly from the means for the university groups, the difference between the mean body response for all high school students is not significantly different from the mean for the university students (Table II).

5. There is significant but low correlation between hand and body response for each group.

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The Physique of Japanese Middle School Boys During the War Years

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(Submitted for publication, July, 1947)

THIS report is concerned with the height, weight, and chest girth of Japanese boys attending the Ueno Metropolitan Middle School during the years 1940 through 1946. It demonstrates certain aspects of the effects of war on the physique of growing boys in a war-torn country. Until 1940 the residents of Tokyo felt little uneasiness about housing, food, clothing, and the necessities of life. In 1941, with the outbreak of the war, the food shortage began. Labor service was required of boys in the middle school, and both mental and physical fatigue were evidenced. During the months from December, 1944, to August, 1945, the air raids were severe, causing further anxiety, loss of sleep, and physical hardship. A survey made in October, 1946, showed that 513 of the 965 pupils then attending school came from homes which had been either totally or partially destroyed by fire resulting from the fire-bombing air raids. It is believed that these and other factors had a retarding effect on the normal growth of the children of Tokyo. Some of these effects may be seen in the data which follow.

DESCRIPTION OF THE DATA

The Metropolitan Ueno Middle School for boys is a five-year school. It stands in the center of Ueno Park, which lies in one of the most congested areas of Tokyo. The school has a normal enrollment of 1,000, but during 1945 and 1946 the number was greatly reduced by separation and war calamities. The number of pupils examined each year is shown in Table I.

The program of measurement is conducted each year during the month of April. Age is calculated to the next birthday. Height without shoes is measured with a stadiometer to the nearest tenth of a centimeter. Weight is recorded to the nearest tenth of a kilogram, with shoes, heavy coats, and jackets removed. Chest girth is measured with a linen tape at the axillary level in mid-inspiration, and recorded to the nearest tenth of a centimeter.

Weight.—Two sets of data are presented in Table II. The first half of the table, based on the annual publications of the Ministry of Education, shows the average weight of Japanese school boys, ages

13 to 18, during the years from 1901 to 1937. The second part of the table shows the average weight of boys at Ueno Middle School during the years 1940 through 1946.

It may be observed that during the four decades preceding the war there was a gradual but steady increase in the average weight of the boys of any given age, the total increase over the period of thirty-six years being approximately 3.5 kilograms in all age groups.

The Ueno Middle School boys, as measured in 1940, were somewhat above the general Japanese averages for 1937. In the years from 1940 through 1946, each age group of the Ueno Middle School boys shows a strong trend toward a decrease in weight, averaging about a kilogram per year. The greatest decreases are noted in the younger groups. In every age group, however, the averages for 1946 are well below those for all Japanese boys in 1937, even though the Ueno group averages in 1940 were well above the averages for the total Japanese school-boy population.

Height.—Comparable data for height are presented in Table III. There are some variations in the data from year to year, and the trend is less clear cut than that shown by the weight data, but the total trend of a decrease in height is again evident.

Chest Girth.—Table IV shows the average chest girth of all Japanese boys from 1901 to 1937 as reported by the Ministry of Education. Again a trend toward increased size over four decades is evident. The lower half of the table shows that during the years of the war the average chest girth of the boys at Ueno Middle School tended to decrease.

SUMMARY

Measurements of height, weight, and chest girth of 7,226 boys between the ages of 13 and 18 who attended the Ueno Middle School in Tokyo during the years 1940 through 1946 are presented. These averages are compared with similar data reported by the Japanese Ministry of Education during the four decades preceding the war. Two trends are noted: In the pre-war years the Japanese school boys in each age group were increasing steadily in weight, height, and chest girth. During the war years this trend was reversed, and

TABLE I

NUMBER OF PUPILS EXAMINED EACH YEAR

	Age					
Year	13	14	15	16	17	18
1940	209	197	203	188	191	25
1941	198	196	207	204	171	22
1942	201	213	203	216	179	25
1943	208	202	215	204	202	22
1944	241	191	185	174	145	19
1945	115	91	95	70	9	10
1946	155	139	203	112	133	38

comparable age groups in each successive year of the war tended to be lighter, shorter, and have smaller chests than did the boys in the preceding years.

TABLE II

AVERAGE WEIGHT OF JAPANESE BOYS

	Age					
Year	13	14	15	16	17	18
1901	29.0 Kg	33.0 Kg	38.0 Kg	43.0 Kg	47.0 Kg	50.0 Kg
1905	29.7	33.5	38.5	42.5	47.5	50.3
1909	29.9	33.6	38.7	44.1	48.0	50.7
1913	30.3	34.1	39.2	44.6	48.5	50.9
1917	30.3	34.1	39.4	45.8	49.2	51.8
1921	30.5	34.6	39.9	45.2	49.1	51.8
1925	31.7	35.2	40.9	46.3	49.8	52.4
1929	31.8	36.2	41.9	47.1	50.6	52.8
1933	32.5	36.7	42.9	48.3	51.4	53.3
1937	32.2	36.5	43.0	48.4	51.5	53.1
1940	36.0	41.3	47.9	50.0	54.3	58.3
1941	34.5	39.4	45.9	50.8	52.4	53.7
1942	34.3	39.7	44.4	48.2	53.2	54.2
1943	33.6	38.0	44.3	48.7	51.5	52.8
1944	29.0	36.0	42.2	49.7	50.5	51.0
1945	32.0	35.6	37.5	48.4	49.0	51.2
1946	31.6	33.2	37.0	42.4	49.4	52.0

Data for 1901 through 1937 reported by Japanese Ministry of Education based on sampling of total schoolboy population. Data for 1940 through 1946 from Ueno Middle School, Tokyo.

TABLE III

AVERAGE HEIGHT OF JAPANESE BOYS

	Age					
Year	13	14	15	16	17	18
1901	133.9 cm	140.0 cm	147.0 cm	152.1 cm	156.1 cm	157.9 cm
1905	133.3	139.7	147.9	152.4	157.0	158.5
1909	133.6	139.4	146.1	152.4	157.3	159.1
1913	134.2	140.0	147.3	153.3	157.6	159.4
1917	134.5	140.0	147.3	153.9	158.2	160.0
1921	134.8	140.6	148.2	154.2	158.2	160.0
1925	135.8	142.1	149.7	155.2	158.8	160.6
1929	136.9	143.2	150.6	157.0	159.6	161.1
1933	137.8	144.0	151.8	156.0	160.3	161.7
1937	137.7	143.9	152.0	157.2	160.1	161.0
1940	146.0	152.4	156.4	164.0	166.4	166.7
1941	143.3	149.6	156.8	162.5	162.9	163.4
1942	143.1	150.3	155.7	159.3	163.8	164.5
1943	141.8	147.1	154.5	155.3	161.9	163.5
1944	146.7	147.0	160.4	161.4	162.0	162.5
1945	145.4	146.0	161.0	161.7	162.1	163.2
1946	145.7	154.5	155.7	156.9	158.5	151.5

Data for 1901 through 1937 reported by Japanese Ministry of Education based on sampling of total schoolboy population. Data for 1940 through 1946 from Ueno Middle School, Tokyo.

TABLE IV

AVERAGE CHEST GIRTH OF JAPANESE BOYS

	Age					
Year	13	14	15	16	17	18
1901	64.8 cm	67.0 cm	70.9 cm	73.9 cm	77.0 cm	77.9 cm
1905	65.2	67.6	71.2	74.2	77.0	79.1
1909	65.5	67.9	71.2	74.5	77.3	79.1
1913	65.5	68.2	71.5	74.8	77.9	79.7
1917	66.4	68.8	71.8	75.5	78.2	80.3
1921	65.8	68.5	72.1	75.5	78.2	80.3
1925	66.4	69.1	72.7	76.7	79.1	81.2
1929	66.2	69.3	73.3	76.7	79.3	81.2
1933	66.4	70.2	74.5	77.3	80.3	81.7
1937	66.9	70.0	74.5	78.1	80.7	82.4
1940	70.2	72.7	74.0	78.8	81.2	83.0
1941	67.4	71.2	76.4	79.5	82.6	82.7
1942	68.0	71.6	76.0	77.6	81.0	83.1
1943	66.6	69.2	73.5	77.2	80.6	80.8
1944	67.5	70.3	73.9	77.0	79.3	80.2
1945	64.4	67.8	75.2	76.4	80.0	82.0
1946	65.0	70.5	72.7	75.7	80.4	82.2

Data for 1901 through 1937 reported by Japanese Ministry of Education based on sampling of total schoolboy population. Data for 1940 through 1946 from Ueno Middle School, Tokyo.

A Survey of Boxing Laws of the Forty-Eight States As Applied to High Schools

By William F. Duffy

Clarence Edwards Junior High School
Boston, Massachusetts

(Submitted for publication, August, 1947)

INTRODUCTION

FOR a number of years interschool boxing in the high schools of Louisiana, Virginia, Washington, and a few other states has been successfully conducted.

"While there has been considerable interest in high school and preparatory-school boxing in the entire country, certain sections have enjoyed a very popular growth while others have remained dormant."[1]

It was the aim of the writer to determine why these certain states adopted interschool boxing in comparison with the other states which did not foster such a combative sport for the students in their high schools. To measure this purpose it was realized that the statutes of all the states would have to be checked to reveal the answer.

Generally speaking, boxing was banned in most states until 1915.

Before 1915 there was very little legalized boxing. At the turn of the century, boxing, or as it was then called, prize fighting, was legalized in only five states, New York, California, Louisiana, Nevada, and Florida.

About 1915, boxing finally found its way into the statute books of the country. It became legalized in New York through the Walker Boxing Law in 1915. In the Midwest the first state to legalize boxing was Wisconsin in 1915. The Wisconsin Law provided for ten-round, no-decision bouts. It became the model for many other states and was widely copied.[2]

There is no doubt that the men who have come home from World Wars I and II have brought with them an increased interest in boxing. This interest is bound to permeate into more of the secondary schools, colleges, and communities. As a result, high school boxing will be encouraged and promoted.

At the present time boxing in high schools is in an era of expansion, and is rapidly finding a place in the sports curriculum. While boxing has been

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Ed Note.—The AAHPER has taken an official stand against boxing in high schools, but this article is being published in the *Quarterly* for the information it contains.

1T. M. Carruthers. "High- and Preparatory-School Boxing," *Official NCAA Boxing Guide*, New York: A. S. Barnes & Co., 1942, p. 44.

2*Boxing*. Aviation Training Division, Office of Naval Operations, U. S. Navy, Washington, D. C., 1943, p. 8.

legislated against by many high school athletic associations, yet its growth has been steady, and the demand constant.[3]

THE PROBLEM

The purpose of this study is to determine which states, by the nature of their statutes, allow or forbid interschool boxing in their high schools. The solution of this problem involves an attempt to answer the following questions:

1. In which states is interschool boxing not at variance with the law?
2. Which states make provisions in their statutes for boxing in the secondary schools?
3. Which states imply in their statutes that interschool boxing is prohibited?
4. Which states determine whether or not high school boxing is permitted by common law?

NEED OF THE STUDY

The writer, a former intercollegiate and professional boxer,[4] feels that a need exists for this survey in that it will reveal the limitations by law as to the extent to which an athletic director may go in arranging for interschool boxing matches. This survey will also reveal the liability of the athletic director, according to the law, in event of a boxing injury to a pupil while competing in an interschool contest.

Because of the legal nature of the American system of public schools, and because of the number of legal controversies arising in connection with these schools, a study of school law should be one of great importance to educators generally and to school administrators especially.[5]

It is also felt that this survey will be of value:

1. To physical education schools, in imparting this knowledge to their prospective athletic directors.
2. To specialists and instructors in the boxing field in knowing in which states they can conduct or administer the sport.

ORGANIZATION AND PRESENTATION OF DATA

The information needed for this survey was obtained from the attorneys-general of the various states and through research of the state statutes found in the State House Library, Boston, Massachusetts.

The essential features of all the state statutes relative to the purpose of this survey were extracted and set up in a systematic arrangement for presentation.

3*Ibid.*, p. 10.

4Nat Fleischer. "Boxers in the Service," *The Ring Magazine*, 21:12 (January, 1943), p. 26.

5Frederick J. Weltzin. "The Legal Authority of the American Public Schools," *Bulletin No. 7*, University of North Dakota, July, 1930, p. 101.

In answer to the first question of this problem, "In which states is interschool boxing not at variance with the law?" it was found that thirty-two states belong in this category. They are Alabama, Arkansas, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Pennsylvania, Rhode Island, South Dakota, Texas, Virginia, Washington, West Virginia, Wisconsin.

A general view of the laws of the above states as they pertain to the problem is pictured below.

ALA. General Laws of 1939, Sec. 1, Rule 64. No contestant under the age of 14 years shall be permitted to box except amateurs with the express permission of the boxing commission.

MINN. Act of 1945 regarding boxing, State Athletic Commission Rule 1 of Part 111. No competitor shall be permitted to take part in a boxing contest unless he is 16 years of age and a registered amateur.

The following states are grouped together because of the similarity of statutes:

ARK. Pope's Digest of the Statutes of Ark., Sec. 12068.

IND. Laws of General Assembly, 1931, Chap. 93, Rule 113.

LA. Act 279 of 1936.

KANS. Statutes of Kansas (Annotated) 1935, Chap. 74, Art. 29, Section 74-2902.

WASH. Remington Revised Statutes of Wash., 1940, Sec. 8276-16.

A synopsis of the law for the above states is as follows: No amateur boxing, or sparring exhibition, which is defined to be one in which the participants receive no compensation, gift, emoluments, or percentage of the gate receipts shall be subject to the provisions of the laws of the State Athletic Commissions.

MD. Act Creating State Athletic Commission, Sec. 1-116D, Rules 47 and 54.

N. J. Revised Statutes of N. J. 1937, Vol. 1, Title 5, Chap. 2, Sec. 5:2-5, 5:2-8.

W. VA. From W. Va. Code of 1943, Chap. 29, Art. 5.

A synopsis of the law for the above states is as follows: The State Boxing Commission has sole direction and jurisdiction over all boxing matches conducted in the state. Every license shall be subject to such rules and regulations and amendments thereto as the Commission may prescribe.

CALIF. Deering's Cal. Code, 1944, Art. 4, Sec. 18651.

CONN. General Statutes of Conn. 1930, Revision, Sec. 2205.

COLO. An Act Relating to Boxing Matches, 1935, Sec. 12.

GA. Acts and Resolutions of General Assembly, 1937, No. 500.

IDAHO Idaho Code, 1932 annotated, Vol. 13, Title 53, Chap. 5, Sec. 53-511.

ILL. Ill. Revised Statutes 1943, Chap. 10/4/5, Sec. 8.

KY. Kentucky revised statutes, Chap. 229-080.

MICH. Public Acts of Mich. 1939, Act 205.

MISS. Miss. Code 1942, Vol. 6, Title 33, Chap. 1, Sec. 8935.

MONT. Revised Code of Mont. 1935, Sec. 4554.
NEBR. Revised Statutes of Nebr. 1943, Vol. 4, Art. 12, Sec. 71, 1201.
NEV. Nev. Compiled Laws, Sup. 1931-41, Vol. 1, Sec. 905, 14.
N. H. R.L.C. 172, S. 20.
N. MEX. Laws of 1945, Chap. 82.
N. Y. Consolidated Laws of N. Y. 1942, Title 25, Sec. 9130.
N. D. N. D. Revised Code of 1943, Vol. V, Title 53-0118.
PA. Purdon's Pa. Statutes 1936, Title 33, Chap. 1, Sec. 23.
R. I. General Laws 1938 (amended) Sec. 1, Part 4, Chap. 16.
S. D. S. D. Code of 1939, Vol. 3, Title 53.0607.
TEXAS Vernon's Tex. Statutes 1936, Art. 614-1 (b).
VA. Chapter 31 D, Section 585 (51).
WISC. Laws of 1945, Chap. 401 (No. 255 S), Sec. 169.22, Part (1).

A synopsis of the law for the above states is as follows: The State Athletic Commission is created with power to have full authority, regulating the control over all boxing contests or exhibitions in these states. Exempted from the jurisdiction of the state athletic commissions are amateur boxing exhibitions held under the supervision of any school, college, or university having an academic course of study or of the recognized athletic association connected with such school, college, or university.

In answer to the second question of this problem, "Which states make provisions in their statutes for boxing in the secondary schools?" it was found that twenty-two states belong in this category. They are California, Colorado, Connecticut, Georgia, Idaho, Illinois, Kentucky, Michigan, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Dakota, Pennsylvania, Rhode Island, South Dakota, Texas, Virginia, and Wisconsin.

A synopsis of the law for the above states is as follows: The State Athletic Commission is created with power to have full authority, regulating the control over all boxing contests or exhibitions in these states. Exempted from the jurisdiction of the state athletic commissions are amateur boxing exhibitions held under the supervision of any school, college, or university, having an academic course of study or of the recognized athletic association connected with such school, college, or university.

It should be noted that, although the state law makes provisions for boxing in high schools, it does not necessarily mean that the policy of the state's high school athletic association is in accord.

In answer to the third question of this problem, "Which states imply in their statutes that interschool boxing is prohibited?" it was found that eleven states belong in this category. They are Delaware, Florida, Iowa, Massachusetts, Maine, Missouri, Ohio, Oklahoma, Tennessee, Utah, Wyoming.

A general view of the laws of the above states, as they pertain to the problem, is pictured below.

An eighteen-year-old age limit makes boxing impracticable in the high schools of the following states:

DEL. Rev. Code of Del. 1935, Chap. 164, 5522, Sec. 12.
MASS. General Laws of Mass., 1932, Chap. 147, Sec. 39.
UTAH Utah Code, 1943, Vol. 1, Title 9, Sec. 9, Rule 5.
WYO. Wyoming Revised Statutes, 1931, Chap. 15-111.

A synopsis of the law for the above states is as follows: No person under eighteen years of age shall be permitted to engage in any boxing or sparring match or exhibition.

MAINE Statute relating to boxing, Sec. 8, Rule 3. "No contestant under the age of seventeen shall be allowed to engage in any boxing contest."

FLA. Fla. Statutes, 1941, Vol. 1, Chap. 548, Sec. 548.03. The law makes definite exceptions permitting certain organizations and colleges to hold boxing contests, but it does not except high schools.

IOWA Iowa Code 1946, Vol. II, Chap. 727, Sec. 727.5. "Whoever engages in any boxing contest or sparring exhibition with or without gloves for a prize, reward, or anything of value at which an admission fee is charged or received . . . shall be fined not exceeding three hundred dollars or imprisoned in the county jail not exceeding ninety days."

MO. Rev. Statutes of Mo., 1939, Vol. 2, Chap. 106, Sec. 14605. The law makes provisions for wrestling in educational institutions but not for boxing in such institutions.

OHIO Baldwin's Ohio Code, 1936, Sec. 12803. The law makes exceptions for boxing in public gymnasiums and athletic clubs but no mention is made of boxing in schools.

OKLA. Oklahoma Statute 1941, 1331. "Every person who engages in, instigates, encourages, or promotes, any ring or prize fight or any other premeditated fight or contention, whether as principal, aid, second, umpire, surgeon, or otherwise, although no death or personal injury ensues, is guilty of a misdemeanor."

TENN. Williams' Annotated Code of Tenn. 1934, Vol. 7, Art. VII, Chap. 5, Sec. 11039-6674. "It shall be unlawful for any person or persons to engage in what is known as prize fighting or sparring, with or without gloves, or in other brutal sports or exhibitions, whereby bruising, maiming, or other serious bodily injury may result to the boxers or participants; provided, that this section shall not be construed to apply to football or baseball games or other sport not of the like sort with prize fighting or boxing..."

In answer to the fourth question, "Which states determine whether or not high school boxing is permitted by Common Law?" it was found that five states belong in this category. They are Arizona, North Carolina, Oregon, South Carolina, and Vermont.

A general view of the laws of the above states, as they pertain to the problem, is pictured below.

VT. Does not have in its statutes any laws relative to boxing.

The jurisdiction of boxing is determined by county commissioners in the following states:

ARIZ. Ariz. Code 1939, Annotated, Vol. 5, Art. 4, Chap. 67, Sec. 405.
ORE. Oregon Compiled Laws Annotated, Chap. 25, Title 95.
S. C. Code of Laws of S. C., 1942, Vol. 4, Art. II, Sec. 7153.

A synopsis of the laws for the above states follows: No boxing contest shall be held without first obtaining permission of the boxing commission of the county wherein the contest is to be held, and the contest shall be under the direct and exclusive control and subject to such rules, regulations, restrictions, or requirements as said county boxing commission shall make or issue.

N. C. General Statutes, Art. 18, Sec. 160-200, is the only statute dealing with boxing. It considers prize fighting, sparring match, or glove or fist contest for money or other valuable prize or stake a misdemeanor. However, it is common knowledge that the colleges and high schools of North Carolina have engaged in interschool contests. In a letter signed by Clifton W. Beckwith, of the Department of Justice, Director, Division of Legislative Drafting, in Raleigh, N. C. he says, "We have no statewide statute covering boxing in high schools and until interrupted by the war, interest in interschool high school boxing was widespread throughout the state, a state boxing tournament being held at the University of North Carolina each year.

CONCLUSION

The writer concludes that of the forty-eight states, thirty-two are not at variance with the law in regard to boxing in the high schools. Twenty-two out of these thirty-two have provisions in their statutes for boxing in the secondary schools. Eleven states imply in their statutes that interschool boxing is prohibited. Five states determine whether or not boxing is permitted in high schools by common law.

While it does not seem feasible at present to inaugurate any nationwide legislation forbidding or allowing high school boxing, it does seem advisable to investigate the merits or defects of present legislation in geographical sections where high school boxing is flourishing.

The Effect of the Regular Use of The Swimming Pool During the Winter Months On the Frequency and Severity of Cold Infections

By Arthur Humphrey and William Ferinden

Board of Education
Jersey City, New Jersey

(*Submitted for publication, April, 1947*)

INTRODUCTION

IT has long been assumed that the use of the swimming pool during the winter months results in an increase in the number and severity of cold infections. In the fall of each year swimming teachers are frequently faced with this objection to swimming by students with requests for reassignment to "gym." The objection is usually advanced by parents and sometimes supported by family physicians. In many cases parents refuse to allow their children to take swimming thus depriving them of an opportunity to acquire a skill found to be the best in all-around contribution by the Committee on Curriculum Research of the Society of State Directors as the result of a survey of the relative contributions made by the various activities in physical education.*

A perusal of class records over the past ten years revealed that swimming classes in the Jersey City high schools were reduced as much as twenty percent in some cases due to schedule changes based on requests to "go back to gym" because of the cold problem.

PURPOSE

This study was undertaken in an effort to ascertain whether the objections had any basis in fact or were merely prejudice or opinion.

DELIMITATIONS

The study was carried out at Dickinson High School of Jersey City, N. J., from December 30, 1945, to March 30, 1946. Approximately 300 boys were involved in the experiment. The study was further limited to those students whose health records showed them to be free of predisposing factors such as sinus trouble, chronic nasal or throat infections, or an unusual rate of absences or illnesses due to cold infections in previous years.

*"Report of the Committee on Curriculum Research," *Research Quarterly*, 1:2 (May, 1930), 15-40.

PROCEDURES

Three groups of boys were selected for the study. The first group consisted of eighty boys from the eleventh and twelfth grades who were temporarily excused from physical education for the duration of the study. They were called the "Non-Physical Education Group."

The second group consisted of eighty boys from the same grades enrolled in gym classes, but who did not take swimming. They were called the "Gym Group." The third group consisted of the same number enrolled in the regular swimming classes. This group was designated the "Swimmers' Group."

The groups were selected at random. One-third of the entire gym class was assigned to each group.

COLLECTION OF DATA

Individual record cards were printed which provided for the recording of the following data:

1. Presence of cold.
2. Absence from school due to colds.
3. Number of times.

This information was recorded for each boy daily for 90 days. The members of the first group followed their regular school routine but did not engage in physical education activity during the study. The second group participated in their regular gym classes every day and the third group confined their physical activity to the pool.

To simplify the recording of data the following code was used:

A. Student has a cold.
B. Student absent due to cold.
C. Doctor consulted because of cold.
X. Student is O.K.

Students with slight colds not requiring medical consultation were checked by study and physical education teachers. The usual symptoms, running noses, coughs, etc., were the determining factors.

SUMMARY OF DATA

At the end of the ninety-day period the data were collected from the gym, swimming, and study teachers. These data were then studied and compiled. The results are shown in Table I.

TABLE I

	Non-Phys. Educ. Group	*Gym Group*	*Swim Group*
Number of Pupils	78	77	78
Total Days of Colds	878	700	549
Averages Per Pupil	11	9.1	7
Absences	83	27	12
Time Doctor Consulted	23	0	0

RESULTS

Number of Days with Colds.—These data show that there were 878 pupil days of cold infections for the boys in the Non-Physical Education Group. The average number of days was 11 days per boy for the three-month period. The total number of days for the Gym Group was 700 with an average of 9.1 days per boy for the three-month period. The number of days for the Swimmers' Group was 549 with an average of 7 days per boy for the period.

Absences from School with Colds.—The data also show that the absences from school due to colds totaled 83 days for the non-activity group, 27 days for the gym group, and 12 days for the swimming group.

Number of Times Physician Consulted.—The members of the non-activity group required the services of a physician 23 times for colds; while at no time did the other two groups require medical treatment for colds.

CONCLUSIONS

Although no generalization can be made without extensive study on a wider scale certain conclusions may be inferred from the results of this study.

1. The boys in the swimming classes average fewer colds than either the gym or non-activity groups.
2. The average duration of infections is shorter for the boys in the swimming and gym classes than for the boys not engaged in physical activity.
3. The boys in the swimming and gym classes are not absent from school because of colds as frequently as the group not engaged in physical activity.

The conclusions drawn from the findings of this study seem to indicate that there is no basis for the belief that swimming activity during the winter months results in an increase in frequency and severity of cold infections but that, on the contrary, resistance to colds can be developed through participation in aquatics. The conclusions drawn are only indicative, however, and apply to this project alone. More extensive research must be conducted before any generalizations can be made.

Active Recreational Interests of Columbia College Alumni

By L. Carroll Adams

Columbia University
New York City

(*Submitted for publication, December, 1947*)

INTRODUCTION

COLUMBIA College, an undergraduate, liberal arts college for men, founded in 1754, is an independent unit of Columbia University, with a normal enrollment of 1,800 students. It was one of the first American colleges to require physical education of all freshmen and sophomore students. In the minutes of the meeting of the faculty of Columbia College during the year 1897 may be found the following statement: " . . . as a part of the new curriculum, physical education is prescribed for all first- and second-year students."

At that time there were many so-called "systems" of physical education in this country, and just which one should be taught formed the basis for a lively contest. The program of activities at Columbia was at first patterned after the Swedish system of calisthenic exercise and formal gymnastic activities. Intercollegiate athletics were largely a student enterprise. The faculty was opposed to what it considered foolish play, but despite this attitude, sports and games began to assume an increasingly important place in collegiate life. Consequently, the program of physical education at Columbia evolved through the natural preferences of students, and by 1930 all formal activities had been replaced by sports and games.

PURPOSE

This study, sponsored jointly by the Columbia University Department of Physical Education and the Alumni Association, is an attempt to learn what effect the College program of physical education has had upon the recreational habits of Columbia alumni over the past forty years. More specifically stated, this study attempts to discover (1) the activities in which the alumni participate most frequently, (2) the percentage of Columbia College alumni who regularly take physical exercise, (3) the reasons why some graduates do not regularly engage in active recreation, (4) where the alumni learned to play games and sports in which they engage, (5) whether or not members of an occupation have a preference for certain types

of physical exercise, and (6) what opinions the alumni have regarding the value of games and sports, with respect to the influence these activities are thought to have upon their health, enjoyment of life, and occupation. The ultimate purpose of this study is to use the pertinent findings as a point of reference for gearing the Columbia College program of physical education to the needs of students and graduates.

METHOD OF INVESTIGATION

A questionnaire was distributed to 3,394 Columbia College graduates, living throughout the United States. This survey covered nine reunion classes, each separated by five years. Replies from 697 alumni were received, as shown in Table I.

TABLE I

Classes Polled	*Questionnaires Sent*	*Replies Received*	*Percent of Replies Received*	*Percent who Exercise Regularly*
1907	117	37	32	37
1912	157	38	24	49
1917	112	15	13	60
1922	508	120	24	38
1927	477	102	21	43
1932	446	94	21	44
1937	440	105	24	39
1942	507	97	19	45
1947	630	89	14	45
Totals:	3394	697	Averages: 21%	43%

RESULTS

While the results, as stated below, are insufficient to be considered conclusive, they are at least indicative of certain trends.

1. Forty-three percent of the 697 alumni responding stated that they engaged regularly in physical exercise, on the average of five and three-quarter hours weekly; ninety percent of the group indicated either regular or occasional participation; and ten percent stated that they did not engage in planned physical exercise at all.

2. The alumni replying to the questionnaire were employed in forty-four occupations. Medicine, law, engineering, and teaching, in the order named, attracted the greatest number of graduates, as fifty-four percent of the entire group were employed in these four fields.

3. The average alumnus responding was thirty-seven and three-quarters' years of age.

4. Forty-one percent of the alumni stated that they could trace their interest in games and sports back to Columbia College days, while fifty-nine percent indicated that they could not.

5. To the question, "If you play games and sports, where did you learn to play them?" replies from 23.3 percent of the respond-

ing alumni indicated that they learned at Columbia. The remaining 76.7 percent learned at places other than at Columbia, as follows:

1. At school (elementary and secondary)	28.2%
2. In childhood	17.0%
3. With friends	7.4%
4. At camp	7.2%
5. By self	4.5%
6. At home	4.0%
7. At Y.M.C.A.	2.5%
8. At clubs	2.4%
9. On golf course	1.6%
10. With U. S. Army or Navy	1.1%
11. At beach	.4%
12. At church	.4%

6. Playing games and sports was thought to be of value to eighty-two percent of the alumni with respect to their health; forty-eight percent considered participation of value in their occupation; and ninety-one percent indicated that it was of value in their recreational pursuits.

7. The reasons given by the alumni for not participating regularly in physical exercise were:

1. Lack of time	36%
2. Conditions of personal health	14%
3. Business reasons	11%
4. Lack of available facilities	9%
5. Lack of interest	7%
6. Priority of other interests	5%
7. Lack of opportunity	4%
8. Too old	4%
9. Indifference	4%
10. Financial reasons	3%
11. Dislike for activities	1%
12. Lack of knowledge of what to do	1%
13. Miscellaneous reasons	1%

8. The popularity of activities according to the number of times each activity was mentioned by the alumni may be seen in Table II.

ANALYSIS OF FINDINGS

By analyzing the results, the following information was revealed:

1. Individuals in various vocations and professions revealed marked similarity as to their choices of sports and games. The physical activities in which physicians engage, for example, are the same ones which lawyers, engineers, and teachers prefer.

2. Individual recreational games and sports requiring a small number of participants predominate among the most frequently mentioned activities.

3. Many alumni cease all exercise when they begin to earn a living.

4. Participation by most alumni is seasonal. The time of greatest activity is during the summer months.

TABLE II

Most Popular Alumni Sports

(Showing Totals of Activities by Season Reported by 697 Graduates of Columbia College)

	1907		1912		1917		1922		1927		1932		1937		1942		1947		Total	
Activities*	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.	Wint.	Sum.
Swimming		10	2	14	1	11	4	48	4	49	6	55	1	65	6	64	7	70	31	386
Tennis		3	1	5	1	5		26	6	22		37	5	46	1	42	1	44	15	226
Golf	1	9	8	17	1	12	1	37		38	2	27		31	1	30		16	14	217
Walking	16	9	15	9	5	3	24	16	11	4	5	5	6	2	2	5	5	1	89	54
Handball	1				1	1	4	1	6	2	8	7	7	2	14	6	20	9	61	28
Bowling			1		2	1	8		13	2	9	1	16		20		13		82	4
Hiking	3	4	2	2	1		1	4	3	5	3	6	8	6	3	9	5	8	29	44
Ice Skating			3		2		9		12		15		8		14		10		73	
Softball						1		8		5		9		9	3	18		15	3	65
Basketball			1				2				1		5		20	2	31	3	60	5
Gardening		3		8		1	2	26		10		8		4					2	60
Physical Work		1	1	1	1	1	8	11	9	7	6	3	3	2	1		1	1	30	27
Skiing			3		2		6		5		7		6		8		12		49	
Baseball									1	3		4		4		13		19	1	43
Fishing		3				1	2	5		6	6	7	1	2		4		3	9	31
Squash					1		5	1	3		6		10		8		1	1	34	2
Calisthenics	1	1	2	2	1	1	5	2	3	2	5	2			2	1	2		21	11
Horseback	1	1		1	1	1	3	4		1	2	4	1	3		1		7	8	23
Sailing				1		2		2		7		3	3	4		3		5	3	27
Badminton							3	3	6	3	1	2	1	2	4	1	1		16	11
Table Tennis	1			1		1	4	1	3		2	1	3		1		3		17	4

*Other activities (with their winter and summer totals respectively) mentioned by alumni included: tobogganing (3), canoeing (1, 9), boating (1, 9), hunting (11, 3), volleyball (10, 5), mountain climbing (3, 2), gym work (8), bicycling (8, 16), polo (1), dancing (4, 1), farming (1), roller skating (3), football (8), track (10, 2), rifle shooting (2, 2), weight lifting (4, 2), billiards (3), touch football (9), horseshoe pitching (1), boxing (2), rowing (1, 9), wrestling (4), camping (1), ice boating (1), water polo (2, 1), fencing (3), lacrosse (1), hockey (3), soccer (1), ocean racing (1). When two or more activities were listed by respondents, they were given equal value.

5. The more recently graduated classes revealed the greatest variety of interests in physical activities.

6. The percentage of alumni in each graduating class who exercise regularly approximates the average of all the classes studied. This indicates no lessening of desire to exercise with increasing age of the graduates.

7. Despite the fact that formal exercises were taught to all classes graduating through 1927, very few of the alumni follow that type of exercise today.

IMPLICATIONS FOR PHYSICAL EDUCATION AT COLUMBIA

1. Games and sports which can be played after college days, such as tennis, golf, swimming, and bowling, should be taught in the physical education program.

2. Obviously, the College cannot teach certain activities which are popular among the alumni, such as hunting, fishing, and gardening, but these activities might be encouraged as forms of desirable and pleasurable recreation.

3. Habits of exercise should be inculcated in the lives of the students, so that barriers frequently built up in the busy, complex American life may be prevented.

4. Students should be taught and encouraged to engage in physical activities which are not seasonal. Activities suitable for winter months should receive special attention.

5. The broad interests of alumni in active recreation indicates the need for adequate and up-to-date facilities and equipment, so that students can learn to participate in activities in which they are likely to engage after graduating from college.

billiards (3), touch football (3), horseshoe pitching (1), boxing (2), rowing (1, 9), wrestling (4), camping (1), ice boating (1), water polo (2, 1), fencing (3), lacrosse (1), hockey (3), soccer (1), ocean racing (1). When two or more activities were listed by respondents, they were given equal value.

Research Abstracts

By Granville B. Johnson

ANATOMY

Stotler, William A., Raymond A. McMahon, "The innervation and structure of the conductive system of the human heart," *J. Comp. Neur.*, 87:2 (October, 1947).

The innervation to the musculature of the human heart is confined to the elements of the conductive system. The sino-auricular node and the atrioentricular node and bundle are richly supplied with nerves. The nerve endings on the elements of the conductive system range from the terminations of simple varicose fibers to complex reticular structures. The blood vessels in the walls of the atria and ventricles, including the capillaries, are strongly innervated. A rich endocardial nerve plexus of presumed sensory function is present in all chambers of the heart. Contrary to recent reports the components of the human conductive system are easily identified both grossly and microscopically. The microscopic appearance of the nodes and bundle is described.—*Wistar Institute.*

NUTRITION

Deuel, Harry J., Jr., Richard M. Johnson with the technical assistance of Clarence E. Calbert, Max Fields, Jane Gardner, Bioletta Thomas, "A comparison of the utilization and acceptability of fresh and dehydrated food," *J. Nutrition*, 34:5, pp. 507-521 (November, 1947).

Prolonged feeding tests were carried out on eight male subjects where fresh food diets and comparable diets made from dehydrated foods were employed. No difference in nutritive value were obtained between the two types of food as determined by protein and fat digestibilities, nitrogen balance, and changes in body weight. Fecal nitrogen values were identical on the diets made from the two types of food. No alterations in water metabolism were noted. The acceptability of the foods as determined in ad libitum tests were equally good with the fresh and dehydrated foods. Although considerable variations in stool bulk were noted in different subjects, it was found to be relatively constant on any one subject irrespective of diet.—*Wistar Institute.*

Friedemann, Theodore E., Velma M. Kinney, George H. Berryman, Charles R. Henderson, John B. Youmans, "The effect of dietary restriction of B-complex vitamins and protein on the excretion of creatinine by human subjects," *J. Nutrition*, 35:1, pp. 117-136 (January, 1948).

Seven physically fit men, ages 22 to 27 years, were subjected to a uniform regimen of physical exercises and tests over a period of 50 weeks during which the variations of creatinine excretion, body weight, and physical performance were studied; during 11 weeks with a "normal" diet I; during 36 weeks with a creatinine-free diet II containing 45 gm protein and greatly restricted quantities of B-complex vitamins, during the latter half of which supplementation was instituted; and during 3 weeks with a rehabilitation diet III. Two subjects served as "controls" on the effect of the restricted diet. Throughout, the average weekly creatinine excretion rose and fell in an apparently rhythmic manner, with maximum variations of ± 5%. During the first 5 weeks of diet II, the average coefficients of six subjects, weighing 62.9 to 77.0 kg, agreed within −6.1 to +6.5% of the mean of 24.7 mg per kg per day; the coefficient of the seventh subject, who was fat and weighed 83.1 kg, was 22.2 mg. The creatinine excretion, the coefficient, and physical efficiency fell gradually during 18 weeks of diet period II. No immediate marked rise of creatinine excretion or

physical improvement was noted with added supplements of thiamine, casein, and six other crystalline B-complex vitamins, either alone or all together, although rapid remission of the early signs and symptoms of deficiency was noted.—*Wistar Institute.*

Scheer, Bradley T., Evelyn E. Straub, Max Fields, Emily R. Meserve, Cornelia Hendrick, Harry J. Deuel, Jr. "The effect of fat level of the diet on general nutrition," *J. Nutrition,* 34:5 pp. 581-586 (November, 1947).

A comparison of body composition of rats was made in cases in which diets varied in fat content from 0 to 40% and in which the caloric intake was normal or severely restricted. It was found that in general the fat content of the body is not related to the fat level in the diet. Highest body fat levels were obtained on diets containing 20% of fat. When a severe caloric restriction was produced in weanling or young adult rats, a relatively high water and ash content resulted while the tissue fat content was uniformly very low. The larger body size of rats obtained earlier on diets containing liberal amounts of fat compared with fat-free diets was found not to be the result of deposition of fat. No evidence was found that the effects of varying fat content in the diet on resistance to undernutrition and on physical capacity was the result of differences in gross body composition.—*Wistar Institute.*

Guerrant, Nollis B., Oliver B. Fardig, "The thiamine and riboflavin content of whole wheat, nonenriched and enriched flours, and of breads made therefrom," *J. Nutrition,* 34:5, pp. 523-542 (November, 1947).

A study was made of the relative thiamine and riboflavin content of whole wheat, nonenriched and enriched flour of common origin, and of breads made therefrom. Four hundred and fifty young rats constituting 38 experimental groups were used in the study. All animals were subjected to a two-week adaptation period before being placed on experiment. The feeding period was of eight weeks' duration unless death of experimental subject intervened. When wheat, flour, and enriched flour of common origin were assayed, it was found that flour, enriched in accordance with the present formula, is definitely superior to nonenriched flour and is somewhat superior to whole wheat with respect to thiamine and riboflavin. Although the amount of thiamine contributed by ground whole wheat and by enriched flour, when the flours composed 30% of the diet, is only slightly less than that required for optimal growth in young rats, the amount of riboflavin contributed is definitely insufficient. However, the enriched flour contained more riboflavin than the original wheat. Breads made from ground wheat and from enriched flour show good retention of thiamine and riboflavin. Dark bread and milk bread, as prepared and used in these studies, were found to be definitely inferior to breads made from ground whole wheat or from enriched flour as sources of thiamine and somewhat less inferior as sources of riboflavin.—*Wistar Institute.*

Scott, Edward M., Ethel L. Verney, "The nature of appetites for B vitamins," *J. Nutrition,* 34:5 pp. 471-480 (November, 1947).

When rats previously fed a diet deficient in thiamine, riboflavin, or pyridoxine were allowed their choice of a flavored diet containing the vitamin, and an unflavored diet containing none, they favored the vitamin-containing diet. When the flavor was changed to the vitamin-free diet, the animal tended to eat this diet. It was concluded that the appetite for these vitamins was learned, probably as a result of a feeling of well-being experienced by the animal. Deficient rats continue to eat a vitamin-containing diet because (1) a persis-

tent stimulus to eat it is present, and (2) the habit of eating it is set up.—*Wistar Institute.*

Robertson, Elizabeth C., Catherine M. Tatham, Norma F. Walker, Myrabell R. Weaver, "The effect of added thiamine on growth, vision and learning, using identical twins," *J. Nutrition* 34:6 pp. 691-700 (December, 1947).

After initial tests of physical status, vision, intelligence (Binet), reasoning, reading, arithmetic, immediate memory, memorization of names and faces, code substitution, and nail sorting had been given, one-half of 36 pairs of proven identical twins were given 2 mg of thiamine in tablet form daily, in addition to their usual meals. The other half received a lactose placebo each day. The twins, aged 7 to 15 years, were living in their homes. The thiamine content of their food was calculated. Half of them were eating considerably less thiamine than is recommended by the Food and Nutrition Board (N.R.C.). One-third were receiving approximately the recommended amount and one-sixth, amounts in excess of this. The last four psychological tests were repeated every three weeks for 4½ months, at the end of which time all the tests were re-administered. When compared with the controls, the thiamine-fed twins showed gains that were almost statistically significant in weight, height, prolonged memory (face-name test) and manual dexterity (nail sorting). The other tests gave results of no statistical significance. Twenty-five pairs of twins were kept on therapy for 4½ months longer and were given all the tests once again at the end of that period. None of these tests showed differences that were statistically significant.—*Wistar Institute.*

Neilands, John B., Frank M. Strong, Conrad A. Elvehjem, "The nutritive value of canned foods: Vitamine content of canned fish products," *J. Nutrition,* 34:6 pp. 633-641 (December, 1947).

A number of samples of canned fish representing six different specials were tested for their content of vitamins A, D, and certain water-soluble vitamins. Vitamin A as such was present in appreciable amounts only in salmon. Thiamine and folic acid were generally rather low. Riboflavin, pantothenic acid, and biotin were present in fair amounts. The samples proved to be a good source of nicotinic acid and pyridoxine. All species examined were good sources of vitamin D.—*Wistar Institute.*

PHYSICAL ANTHROPOLOGY

Edgerton, Harold A., Steuart H. Britt, Ralph D. Norman, "Physical differences between ranking and non-ranking contestants in the first annual science talent search," *Am. J. Phys. Anthrop.,* (ns) 5:4, pp. 435-452 (December, 1947).

Physical and "racial" differences between two groups of male contestants in the first annual science talent search were examined and contrasted with a comparable Army group. Ranking (A group) contestants consisted of winners and honorable mentions in the search; non-ranking (B group) contestants achieved no status. The latter group, as a whole, is also a superior group, however. Materials in this study were derived from a three-year followup with mailed questionnaries, which have some bias. The A group, using data for the first followup year only, has a significant excess of whites, and a deficiency of "other" (excluding negro) races. This group is superior in height, although the difference between the means is not statistically significant. It is slightly inferior to the B group in weight, but age differences may account for this. Both groups are very significantly superior in height and weight to a comparable Army group. Except for the first followup year, in which the A

group has a significant excess of poor vision, it is significantly superior in physical condition. Trends found in the A group are emphasized in the winners' group considered separately. There is strong suspicion that both groups are superior to comparable Selective Service registrants in freedom from physical defect. This study, therefore, is in agreement with previous researches on the gifted in intelligence.—*Wistar Institute.*

Carlson, Anton J., Frederick Hoelzel, "Effect of vegetarian self-selection diets on reproduction and the growth of offspring of rats," *J. Nutrition,* 35:1, pp. 49-55 (January, 1948).

The reproductive performance and growth of offspring of Wistar and Sprague-Dawley rats fed vegetarian self-selection diets was observed in three generations. The vegetarian diets consisted of a basal mixture including corn (whole kernels), wheat, barley (whole grains), rolled oats, sunflower seeds, green peas, soy beans, peanuts, corn germ meal, wheat germ meal, alfalfa leaf meal, brewers' yeast and salt (NaCl). This basal mixture was supplemented, either by lettuce (chiefly), lettuce and celery cabbage, or only by celery cabbage. No significant difference was noted in the effects of the differently supplemented diets on the two strains of rats. Fertility was maintained on the vegetarian diets but the rats raised less than twenty-five percent of their offspring. A high neonatal mortality and the killing and eating of offspring by the mothers seemed to explain the low percentage raised. The growth of the raised offspring was subnormal and increasingly impaired in the successive generations. The males after weaning fared worst. Severe rickets commonly developed.—*Wistar Institute.*

Levy, Robert L., James A. L. Mathers, Alex A. Mueller, and John L. Nickerson, "Effect of smoking cigarettes on the heart." J.A.M.A. 135, pp. 417-422 (October 18, 1947).

The effect of smoking was evaluated by such cardiovascular reactions as cardiac output (determined by the ballistocardiograph), changes in heart rate and blood pressure, and alterations in the form of the electrocardiogram. Subjects were 27 normal persons, and 21 patients with cardiac disease. The latter group included cases of coronary heart disease, hypertensive cardiovascualr disease, and rheumatic heart disease. Cases of peripheral vascular disease were excluded.

In the experimental procedure subjects smoked two cigarettes in succession at their habitual rate, inhaling or not as was their custom. Almost all inhaled. The cardiovascular action was determined before, during, and after smoking.

No significant differences were found between the normal group and the cardiac disease group in any of the indexes employed, nor between those using "regular" as contrasted with "denicotinized" cigarettes. Variability in the effect of smoking was ascribed to individual susceptibility rather than to the presence or absence of cardiac disease.

Because the general effects of smoking were slight, and no greater in patients with heart disease than in normal persons, it was concluded that smoking in moderation by cardiac patients would result in no apparent harm. In the discussion following presentation of this report at an American Medical Association convention, there was general disagreement with the conclusions reported because of the short-term nature of the study, which could not indicate the cumulative effect of smoking.—*Hector W. Kay, Springfield College.*

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Manuscripts.—Manuscripts should be sent to the Editor who will see that each one is read by at least three members of the Board of Associate Editors. The Editor will advise the author as to the suitability of the paper or the desirability for revision. Papers are not judged by arbitrary standards of length but on their content of new research results in the field of physical education, health education, and recreation, presented with the greatest brevity compatible with scientific accuracy and clarity.

Since three members of the Board of Associate Editors review an article it is requested that at least two copies of the manuscript (the original and a clear carbon) be submitted in order to facilitate reviewing. The carbon copy will be returned to the author for checking against galley proofs. Manuscripts should be double spaced.

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Titus, Mary, Building 850, West Campus, Florida State University, Tallahassee.

Torregrosa, Felicio M., University of Puerto Rico, Rio Piedras, Puerto Rico.

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Walker, Charles L., State College, San Jose, California.

Williams, Lafayette, 226 Olive Street, Edwardsville, Illinois.

Wood, Calvin, Caesar Rodney High School Camden, Delaware.

Young, Olive G., Mankato State Teachers College, Mankato, Minnesota.

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(A Department of the National Education Association)

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Health Instruction: Bernice Moss.

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School Nursing: (No election)

Nutrition Education: Alice Smith.

School Physicians: Louis R. Burnett.

Therapeutics: Ellen Kelly.

Physical Education Division

College and University Physical Education for Men: John Shaw.

College and University Physical Education for Women: Mary McKee.

Dance: Dudley Ashton.

Intramural Athletics: John Van Why.

Men's Athletics: P. C. Cobb.

Private School Physical Education: George R. Staten.

Public School Physical Education: John S. Ludham.

Women's Athletics: Alfreda Mosscrop.

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Industrial Recreation: Floyd Eastwood.

Institutional Recreation: Harry D. Edgren.

Municipal Recreation: Dorothea Lensch.

Park Recreation: Dorothea Lensch.

Private Recreation: Harry D. Edgren.

School Recreation: Ruth Abernathy.

General Sections

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Measurement and Evaluation: Esther French.

Professional and Public Relations: Howard Danford.

Professional Education: Ralph Piper.

Research: T. K. Cureton.

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Midwest: Leon G. Kranz.

Northwest: Dorothea Lensch.

Southern: Joy W. Kistler.

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STATE REPRESENTATIVES

(Central District)

Colorado (1): (No report).

Iowa (2): John A. Johnson; Jane Harris.

Kansas (2): Reginald Strait; Eva Lyman.

Minnesota (3): Mabel J. Shirley; Clarence Nelson; P. J. Sandell.

Missouri (2): (No report).

Nebraska (1): Ed Higginbotham.

North Dakota (1): (No report).

South Dakota (1): (No report).

Wyoming (1): Helen M. Newland.

(Eastern District)

Connecticut (2): (No report).

Delaware (1); W. Calvin Wood.

District of Columbia (2): (No report).

Maine (1): Howard G. Richardson.

Maryland (2): (No report).

Massachusetts (3): Robert Berry; Lawrence E. Briggs; Daniel Kelly.

New Hampshire (0): None.

New Jersey (3): Margaret C. Brown; Herbert A. Stine; Warren Fogarty.

New York (6): Ellis Champlin; Frank S. Lloyd; Francis J. Moench; Carroll H. Smith; Marie R. Schuler; John H. Shaw.

Pennsylvania (4): Wilfred C. Collins, Lowell C. Drake, William A. Palmer, Elmer B. Cottrell.

Rhode Island (1): (No report).

Vermont (1): (No report).

(Midwest District)

Illinois (5): Ross Anderson; Norman Ziebell; Ruth Lins; Ray Duncan; Jane Axtell.

Indiana (2): Mark C. Wakefield; Florence Curtis.

Michigan (2): Dorothy J. Parker; Lloyd Olds.

Ohio (3): Edwina Jones; Paul Landis; W. K. Streit.

West Virginia (2): G. Ott Romney; Ruth Robinson.

Wisconsin (2): Marie L. Carns, Clifford B. Fagan.

(Northwest District)

Idaho (1): (No report).

Montana (1): Elena Sliepcevich.

Oregon (2): Vernon Gilmore; Marjorie Herr.

Washington (3): Kathro Kidwell; Jess Puckett; Virginia Shaw.

(Southern District)

Alabama (2): Jessie R. Garrison; Margaret McCall.

Arkansas (1): Mrs. Marjorie Mills.

Florida (2): Grace Fox; Catherine Sample.

Georgia (2): Mrs. Mary E. L. Soule, Lyn Keyes.

Kentucky (1): Hambleton Tapp.

Louisiana (2): (No report).

Mississippi (1): (No report).

North Carolina (2): (No report).

Oklahoma (2): Evelyn Hasenmayer, Flora Mae Ellis.

South Carolina (1): (No report).

Tennessee (2): (No report).

Texas (3): (No report).

Virginia (2): Harold K. Jack; Kirk Montague.

(Southwest District)

Arizona (1): John L. Barringer.

California (5): Verne Landreth; Howard Bell; Anna Espenschade; David Cox; Duane George.

Nevada (0): None.

New Mexico (1): (No report).

Utah (2): (No report).

AFFILIATED ORGANIZATIONS

American Academy of Physical Education: C. H. McCloy.

American Physiotherapy Association: Esther Gilman.

American School Health Association: C. H. Keene.

Boys' Clubs of America, Incorporated: Walter M. Hall.

Canadian Physical Education Association: A. S. Lamb.

College Physical Education Association: Glenn W. Howard.

Delta Psi Kappa: Eurice Miller.

National Association of Physical Education for College Women: Helen Hazelton.

National Collegiate Athletic Association: Frederick W. Luehring.

Phi Delta Pi: Bernice Moss.

Phi Epsilon Kappa: Wilbur DeTurk.

Physical Education Society of the YMCA's of North America: Marshall L. Walters.

Society of State Directors: Charles Spencer.

YWCA Health Education Directors' Society: Grace M. Palmer.